

TOWARDS A PHYLOGENETIC SYSTEMATICS OF THE FOSSIL HEXACTINELLIDA.

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The vast majority of all fossil hexactinellid taxa has been described from the Mesozoic. This is due to the rich occurrence of Mesozoic hexactinellids, especially in the well-exposed Jurassic and Cretaceous strata of Europe, and to the generally larger preservation potential of the rigid Mesozoic hexactinellids compared to the predominantly non-rigid Palaeozoic ones. Nevertheless, most of the main hexactinellid taxa can be traced back to the Early Palaeozoic. Isolated hexasters of the Hexasterophora occur in the Early Ordovician, and the first hexactinosans are known from the Late Devonian, whereas the earliest definite amphidiscophorans are documented from the Late Silurian. However, the bulk of the Palaeozoic hexactinellid sponges, although well established as monophyletic groups, cannot definitely be attributed to any recent taxon and require an exclusively fossil-based systematics. The Early Palaeozoic Protospongiidae and Hintzespongiidae are derived from a reticulate hexactine-bearing ancestors, probably close to the *Mattaspongia-Microstaura*-group, which can be regarded as adelphotaxon of the Hexactinosans. The Dictyospongiidae (s.str.), which are hexasterophorans, probably also originated from the *Mattaspongia*-stem lineage, as did the modern Sceptulophora (Clavularia-Scopularia-taxon), which recently have been traced back to the Early Palaeozoic through the documentation of Ordovician scopules. The Brachiospongiidae, including the Stiodermatidae, may be attributed to the amphidiscophorans, because of the great similarity in skeletal architecture between *Strobilospongia* and the modern Hyalonematidae. However, the systematic affinity of many Palaeozoic lyssacine hexactinellids which appear (or were in fact) primitive, including most Early Cambrian genera such as *Quadrolaminiella*, *Solactiniella* and *Hyalosinica*, is still uncertain, and these taxa have to be classified within the probably non-monophyletic grouping 'Rossellimorpha'. At the end of the Permian, all major

Palaeozoic hexactinellid groups had become extinct, and from the Mesozoic onwards, the Hexactinellida are represented by modern forms, mainly Hexactinosans and Lychniscosans. 'Lyssacinososa', which comprise the majority of Recent hexactinellid taxa, are not commonly found in Mesozoic strata, but nevertheless there are some important occurrences, from which recent genera can be identified. *Regadrella* of the Euplectellidae is known with several species from the Cretaceous, and the first species of the Hyalonematidae, *Hyalonema cretacea*, has been described from the Campanian. But more, new, Late Cretaceous representatives of these groups and also of the Rosselliidae from the section of Arnager (Bornholm, Denmark) are still to be described. The earliest definite lychniscosans are known since the Middle Jurassic, and the group reached its maximal diversity during Late Cretaceous time. Probably, this group did not arise from the hexactinosans, but it is the adelphotaxon of some lyssacine group, maybe the Euplectellidae. Today the Lychniscosans have become almost extinct, so the exact systematic attribution of the Mesozoic families and genera to recent ones is problematic and in many cases impossible. The same thing is true to many Mesozoic hexactinosans, although many Recent genera have now been identified from the Late Cretaceous, and this allows an approach of the zoological systematics at least for Late Mesozoic and Tertiary sponge fossils. However, still many Cretaceous and most Jurassic hexactinosans classified by Schrammen in the grouping 'Inermia', such as the *Casearia-Porospongia*-group, cannot be definitely attributed to any taxa within the Recent systematics, but have to be subject to a phylogenetic-systematic approach based on fossil representatives only. □ *Porifera, phylogeny, systematics, Hexactinellida, fossils, Mesozoic.*

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